Remarks

Claims 28-45 and 50-72 are now in the application. Claims 1-27 and 46-49 have been cancelled as drawn to non-elected inventions, and Applicants reserve the right to file one or more divisional applications directed to such inventions. An early action allowing claims 28-45 and 50-72 is requested.

Election/Restrictions

The Examiner has required restriction to one of the following inventions under 35 U.S.C. §121:

I. Claims 1-27, drawn to a plating solution, classified in class 106, subclass 1.05;

II. Claims 28-45, drawn to a method of plating an aluminum substrate, classified in class 427, subclass 436; and

III. Claims 46-49, drawn to a metal-coated article, classified in class 428, subclass 650.

The Examiner has maintained that the above three inventions are distinct from each other for the reasons provided in the Communication of June 29, 2004, and the inventions have acquired a separate status in the art as shown by their different classification. Applicants hereby affirm the election made by Thomas Adams on June 2, 2004 in a telephone conversation with the Examiner. That is, Applicants elect to prosecute the invention of Group II, claims 28-45. Accordingly, as noted above, claims 1-27 and 46-49 have been cancelled.

Amendments

I. Claims 1-27 and 46-49 have been cancelled as directed to non-elected inventions.

II. Claims 28, 32, 36, 40 and 43 have been amended to incorporate the details of the plating solutions of claims 1, 13, 25, 1, and 13, respectively. In addition, all references to earlier claims have been deleted. Accordingly, claims 28, 32, 36, 40 and 43 are now independent claims.

III. Claim 28 has been further amended to indicate that the acidic immersion plating solution also contains at least one inhibitor containing one or more nitrogen atoms, one or more sulfur atoms, or both sulfur and nitrogen atoms. Support for this limitation is found in original claim 2 which has been cancelled.

IV. Claims 50-72 have been added. Claims 50-59 are dependent from claim 28, and these claims correspond to original claims 3-12. Claims 60-70 are dependent from claim 32, and these claims correspond to original claims 14-24. New claims 71 and 72 are dependent from claim 36, and these claims correspond to original claims 26 and 27.

Accordingly, all of the amended and new claims are fully supported in the original application.

Rejections

I. Claims 28-45 have been rejected under 35 U.S.C. §112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention.

The Examiner has suggested that each of the

> "independent process claims include dependency limitations directed to the compositions of claims 1, 3 or 13. This is not clear. Independent claims may not depend form any other claims. This is not proper. It is not clear what elements of the composition Applicant intended to incorporate into independent process claims 28, 32, 36, 40, and 43."

Although Applicants submit that original claims 28, 32, 36, 40, and 43, prior to this Amendment were proper dependent claims, and although Applicants do not fully understand the Examiner's explanation of the rejection, Applicants have amended claims 28, 32, 36, 40 and 43 so that these claims are now independent claims. Accordingly, it is believed that the rejection of claims 28-45 under 35 U.S.C. §112, should be withdrawn.

II. Claims 28-45 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Wernick et al. (NPL cited by Applicant).

Wernick teaches depositing a zinc alloy coating on an aluminum substrate by immersing the aluminum "in a zinc fluoborate solution containing a trace of nickel fluoborate.... (Page 1041). The example of a zinc fluoborate solution given by Wernick contains 150 g/l of zinc fluoborate, 0.05 g/l nickel fluoborate, and 20 g/l of ammonium chloride, and the solution has a pH at room temperature of 3.0. The Examiner acknowledges that the pH described by Wernick is different from the pH range of 3.5-6.5 stated in claim 28. However, the Examiner maintains that since Wernick teaches a similar acidic pH, it would have been obvious for an ordinary artisan to modify the pH depending on the desired plating properties of the solution. The Examiner has suggested that the pH is a "cause-effective variable", and maintains that it is well settled that determination of optimum values of cause effective variables is within the skill of the art, citing *In re Boesch*, 205 USPQ 215 (CCPA 1980).

Reconsideration and withdrawal of this rejection is solicited since it appears that *In re Boesch* is not applicable to the present situation. The Boesch decision discussed the obviousness of optimizing a variable which was known to be "result effective". The prior art considered by the Patent Office and the CCPA in concluding that the invention claimed by Boesch was obvious described nickel based alloys that had compositional limits "overlapping those of the claimed alloys." (205 USPQ 218), and the issue on appeal was whether the Boesch alloy had a different "sigma phase". In the present situation, the pH of the solutions described in the claims does not "overlap" the pH of the solution described in the prior art. The prior art describes a single example of a zinc fluoborate solution having a pH of 3.0, and there is no teaching or suggestion of any variation in this pH. Accordingly, Applicants respectfully submit that the use of a immersion plating solution as described in claim 28 is not obvious in view of the zinc fluoborate solution described by Wernick.

In addition, claim 28 has been further amended to define the acidic immersion plating bath as containing one or more inhibitors which contain one or more nitrogen atoms, one or more sulfur atoms, or both sulfur and nitrogen atoms. Wernick neither discloses nor suggests the incorporation of such an inhibitor, thus claim 28 cannot be obvious over the zinc fluoborate solution described by Wernick. Moreover, contrary to the Examiner's statement found in line 1 of page 8, the nickel fluborate utilized in Wernick's solution cannot be an example of or act as Applicants' nitrogen-containing inhibitor. There is no nitrogen or sulfur in nickel fluoborate. For all of the above reasons, claim 28 and the claims dependent therefrom (i.e., claims 29-31 and 50-59) are patentable over Wernick et al.

Claims 32-35 and 60-70 are patentable over Wernick et al. since these claims specify that the plating solution contains "from about 5 to about 250 g/l of nickel and/or cobalt ions...." Wernick teaches "a zinc fluoborate solution containing a trace of nickel fluoborate". The example given by Wernick contains 0.05 g/l of nickel fluoborate which is equivalent to 0.0123 g/l of nickel. This is indeed a "trace" of nickel, an amount far less than the minimum of 5 g/l of nickel and/or cobalt ions specified in claims 32-35 and 60-70.

Applicants respectfully submit that the use of the larger amounts of nickel (namely, a minimum of 5 g/l) in claims 32-35 and 60-70 would not be obvious over Wernick whose clear teaching is a zinc fluoborate solution containing "a trace of nickel fluoborate". There is no teaching or suggestion in Wernick to one skilled in the art to prepare an acidic immersion plating solution containing 5 g/l or more of nickel and/or cobalt ions as set forth in these claims. Wernick teaches away from such plating solutions.

The Examiner has stated on Page 7 of the Communication of June 29, 2004:

> Regarding claims 32 and 36, requiring specific concentrations of the zincate bath, Wernick teaches one exemplary concentration combination of substances, but teaches that the composition is "by no means critical".

The above statement is not believed to be an accurate representation of the teachings of Wernick. Wernick makes no such statement regarding the zinc fluoborate solution containing zinc and nickel and described as having a pH of 3.0. The reference to "by no means critical" is to a different solution which contains zinc sulphate and hydrofluoric acid which is different from the plating solutions used in the present invention and this solution has not been relied upon by the Examiner.

With regard to claims 36-39 and 71-72, these claims specify a minimum of 20 g/l of nickel and from 0.005 to about 0.05 g/l of an inhibitor. For the reasons given above with respect to claims 32-35 and 60-70, the rejection of these claims should be withdrawn because Wernick neither teaches nor suggests the use of plating solutions containing 20 or more g/l of nickel and/or cobalt and, in fact, teaches away from the use of such amounts. Moreover, Wernick neither teaches nor suggests the incorporation of any inhibitors into the plating solution. Accordingly, Applicants submit that claims 36-39 and 71-72 are not obvious over Wernick.

With regard to claims 40-45, these claims describe a two-step process wherein an aluminum or aluminum alloy is first coated with a zinc alloy protective coating and thereafter the zinc alloy coated substrate is plated using an electroless or electrolytic plating solution. In view of the amendments to claim 40 specifying that the plating solution also contains at least one inhibitor containing one or more nitrogen atoms, one or more sulfur atoms, or both sulfur and nitrogen atoms, Applicants submit that amended claim 40 and dependent claims 41 and 42 are patentable over Wernick since Wernick does not teach or suggest the incorporation of such inhibitors.

With regard to the rejection of claims 43-45, the Examiner is requested to reconsider this rejection since these claims require the presence of 5 g/l or more of nickel and/or cobalt ions, and as noted above, Wernick teaches away from the use of such plating baths. For all of the above reasons, it is respectfully submitted that claims 28-45 and 49-72 are patentable over Wernick et al. Withdrawal of this rejection is solicited.

III. Claims 28-45 have been rejected under 35 U.S.C. §103(a) as being unpatentable over Suzuki et al. (U.S. 4,888,218) in view of either Zelley (U.S. 2,676,916) or the Applicant's admitted state of the prior art.

Suzuki teaches a process for depositing a zinc alloy coating on an aluminum substrate by immersing the substrate in an aqueous immersion plating solution having a pH of 4-6, and the solution contains zinc and fluoride ions. The Examiner acknowledges that Suzuki fails to teach the inclusion of nickel or cobalt ions. However, the Examiner notes that on Page 2 of Applicant's specification, Applicants state that it is known in the art to use nickel, cobalt or iron in a zincating bath to improve adhesion of the zinc coating (emphasis added). Likewise, according to the Examiner, Zelley teaches that the use of cobalt or nickel in zinc baths forms a uniform, dense, adherent coating on the surface of plated aluminum surfaces. Accordingly, the Examiner concludes that based upon such combination of prior art, it would have been reasonably suggested to use nickel or cobalt in the zinc baths of Suzuki. Reconsideration of this rejection is requested.

Suzuki et al are concerned with a process for applying a zinc coating to an aluminum article which is a relatively "very thick zinc deposit" which itself provides for corrosion resistance. A process of the present invention, and the plating solutions used in the process of the invention are intended to deposit relatively thin zinc alloy deposits as a pre-treatment for subsequent electroless or electrolytic metal plating. Accordingly, Suzuki initially deposits a coating of zinc from a zinc fluoride bath, and the zinc coated aluminum is then heated at temperatures of about 600°C for two minutes (col. 7, lines 8-10) which provides a "zinc-diffused layer that protects the article against corrosion." (Abstract). See also Wernick's discussion of the Suzuki patent in the paragraph bridging pages 1042-1043. Wernick states that the Suzuki process produces "very thick zinc deposits (15-20 g/m^2 versus about 1 g/m^2 for conventional simple zincate baths), and the work is then heat treated to form a diffusion layer containing 1-7% zinc. Clearly, the Suzuki process is different from the process used herein, and the products are different.

The Examiner's reliance upon Zelley in combination with Suzuki is improper since the two references are directed to different types of plating solutions. As noted by the Examiner, Suzuki describes a zinc plating solution having a pH of from 4 to 6 and thus, Suzuki is concerned with acidic plating solutions. In contrast, Zelley is concerned with alkaline zincate baths. That is, Zelley teaches the addition of cobalt or nickel to an alkaline plating solution, not an acidic plating solution as disclosed by Suzuki. Similarly, the statement made by Applicants on page 2 of the specification relates to zincate solutions generally known to be alkaline solutions as described by Zelley in the '916 patent. In addition, in Wernick's discussion of the Suzuki patent at pages 1042 and 1043, Wernick distinguishes Suzuki's acidic zinc fluoride process from zincate solutions. See also, for example, page 1041 of the Wernick reference in the discussion relating to "Ultrasonic Zincate Process". The ultrasonic zincate process described utilizes a "zincate bath" containing 125 g/l of zinc oxide and 400 g/l or sodium hydroxide which is clearly an alkaline bath. Accordingly, it is respectfully submitted that it would not be obvious to utilize an acidic plating solution comprising zinc ions, nickel ions/cobalt ions, and flouride ions in view of Zelley and/or the statement on page 2 of Applicant's specification. Even though it is known to add nickel or cobalt to alkaline zincating baths, there is no teaching or suggestion in the art to utilize cobalt or nickel in acidic plating solutions, and it would not be obvious based upon the knowledge with regard to alkaline zincate baths to utilize nickel or cobalt in an acidic plating bath. Accordingly, Applicants respectfully submit that claims 28-45 and 50-72 are patentable over this combination.

Claims 28-31 and 50-59 are further patentable over the combination of references because these claims specify the presence of at least one inhibitor containing one or more nitrogen atoms, one or more sulfur atoms or both nitrogen and sulfur atoms. None of the references cited by the Examiner teaches or suggests the use of such inhibitors in acidic plating solutions as described in the claims.

Reference to Co-Pending Applications

Pursuant to 37 CFR 1.56(a), Applicants wish to bring to the Examiner's attention two co-pending applications which describe zincate solutions containing the inhibitors utilized in some of the acidic immersion plating solutions utilized in the process of the claimed invention. The co-pending applications are U.S. Serial No. 10/265,864 filed October 7, 2002 and U.S. Serial No. 10/806,839 filed March 3, 2004. Both applications are being examined in Art Unit 1755.

Conclusion

In view of the amendments to the claims and the above remarks, it is respectfully submitted that all of the claims presently in the application, namely claims 28-45 and 50-72 are allowable. An early action to this effect is solicited.

Respectfully submitted,

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